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EREP QUARTERLY PROGRESS REPORT

1 NOVEMBER 1973 to 31 JANUARY 1974

PLANNING APPLICATIONS IN EAST CENTRAL FLORIDA

EXPERIMENT PROPOSAL NO. 385

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EREP PROGRESS REPORT

Covering the period 1 November 1973 to 31 January 1974

PLANNING APPLICATIONS IN EAST CENTRAL FLORIDA

Proposal No. 385

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1 February 1974

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URBAN ANALYSIS

Lakeland

The most populous urban area for which we have received both photography and digital data is Lakeland, population 42,000, located in Polk County approximately 30 miles east of Tampa.

Two land use maps of Lakeland and environs have been prepared, one based on photography and the other on computer maps.

Photography-based map:

The land use map of Lakeland based on photography is shown as Figure 1.

The procedure used in making this map was to project, in turn, 9" enlarged transparencies of the several bands on the screen of a Variscan viewer and trace on a transparent sheet the significant features brought out by the various bands. The magnification used in the enlarger was 6. Although the 9" transparencies have somewhat reduced quality relative to the earlier generation smaller transparencies, this method has the advantage over use of the smaller transparencies in that all of the transparencies used are of the same size and can therefore be used in turn readily on a fixed-step enlarging viewer such as a Variscan.

In addition, this method has the general advantage of photographic enlargement as far as available, with the less accurate viewer enlargement being used only to the extent necessary and found suitable.

Of the bands available, those found to be most useful for this purpose were the color infrared for its vegetation-distinguishing capability, the .7 to .8 μm band for water delineation, and the S190B, for its excellent resolution of urban features.

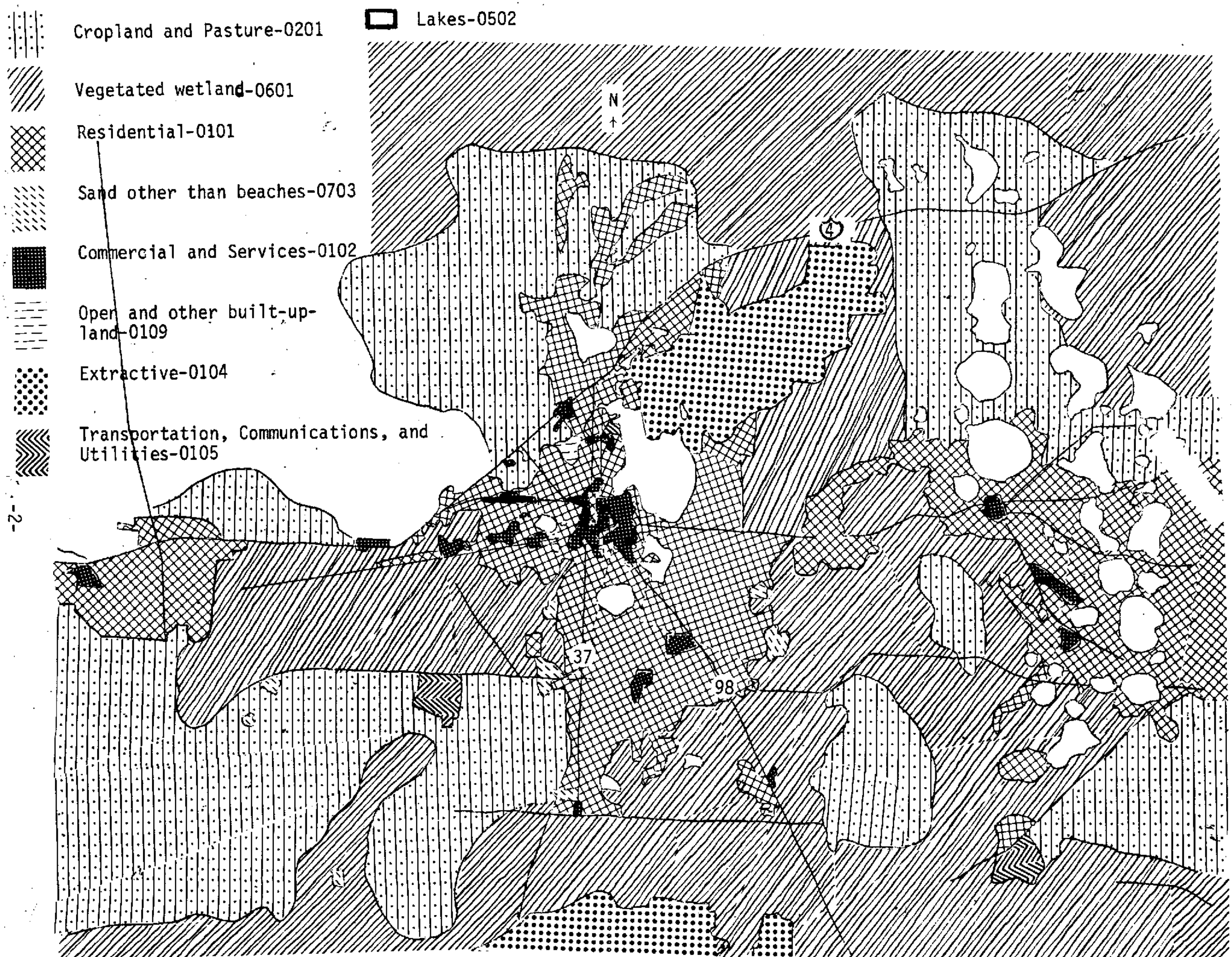
Lakes-0502
Cropland and Pasture-0201
Vegetated wetland-0601
Residential-0101
Sand other than beaches-0703
Commercial and Services-0102
Open and other built-up-land-0109
Extractive-0104
Transportation, Communications, and Utilities-0105
N
4
37
98

FIGURE 1

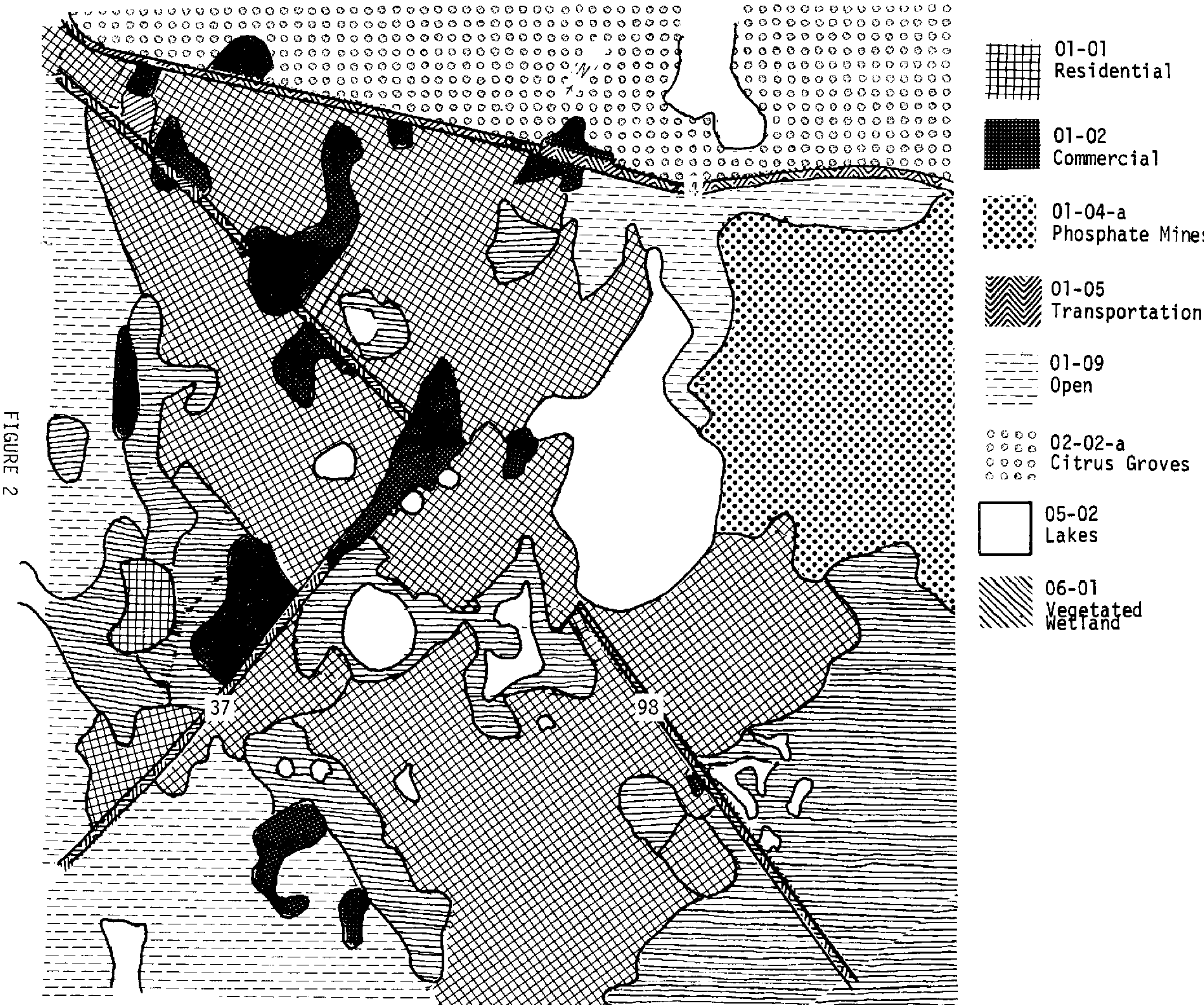

FIGURE 2

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TABLE 1

LAND-USE CATEGORIES:

1st Pair of Digits	2nd Pair of Digits
01. Urban and built-up land	01. Residential 02. Commercial and services 03. Industrial 04 Extraction: a. Phosphate mines 05. Transportation 07. Strip 09. Open
02. Agricultural land	01. Cropland and pasture 02. Groves a. Primarily citrus b. Muck farms (vegetables)
03. Rangeland	01. Grass
04. Forest Land	01. Deciduous 02. Evergreen (pine) 03. Mixed
05. Water	01. Streams and waterways 02. Lakes 05. Other (Gulf of Mexico)
06. Nonforested Wetland	01. Vegetated 02. Bare
07. Barren Land	03. Sand other than beaches
M. Marsh	

LAKES

As reported in our preceding Progress Report[1], EREP photography shows not only distinctive coloration for the highly eutrophied lakes but also, in some cases, patterns of this coloration within a lake. The 0.5-0.6 μm band shows this effect most clearly, as illustrated by Figure 3. The lakes are identified in Table 2. Lakes in an advanced stage of eutrophication are Apopka, Carlton, Beauclair, Dora, Eustis, and to a lesser extent, Griffin. Lake Griffin displays a distinctive pattern over its southern portion. Lakes Harris and Yale are in an intermediate eutrophic state; and Ola, Louisa, Minnehaha, and Silver are relatively "clean." To the above degree of classification, there appears to be a clear cut correspondence between state of eutrophication and color as shown on the 0.5 to 0.6 μm photography.

A quantitative description of the above effect has been obtained by using a Digicol Viewer on the 70 mm. transparency to make densitometer readings for several of the lakes. The results are as given in Table 3. (Only relative values have significance.)

The question remains as to precisely what we are observing and measuring. Florida Game and Fresh Water Fish Commission (G & FWFC) investigators[2] have classified many Florida lakes according to state of

[1] EREP Quarterly Progress Report, 1 November 1973

[2] Richard M. Duchrow
Water Quality Investigations, 1970-71
and
Water Quality Investigations, 1971-72

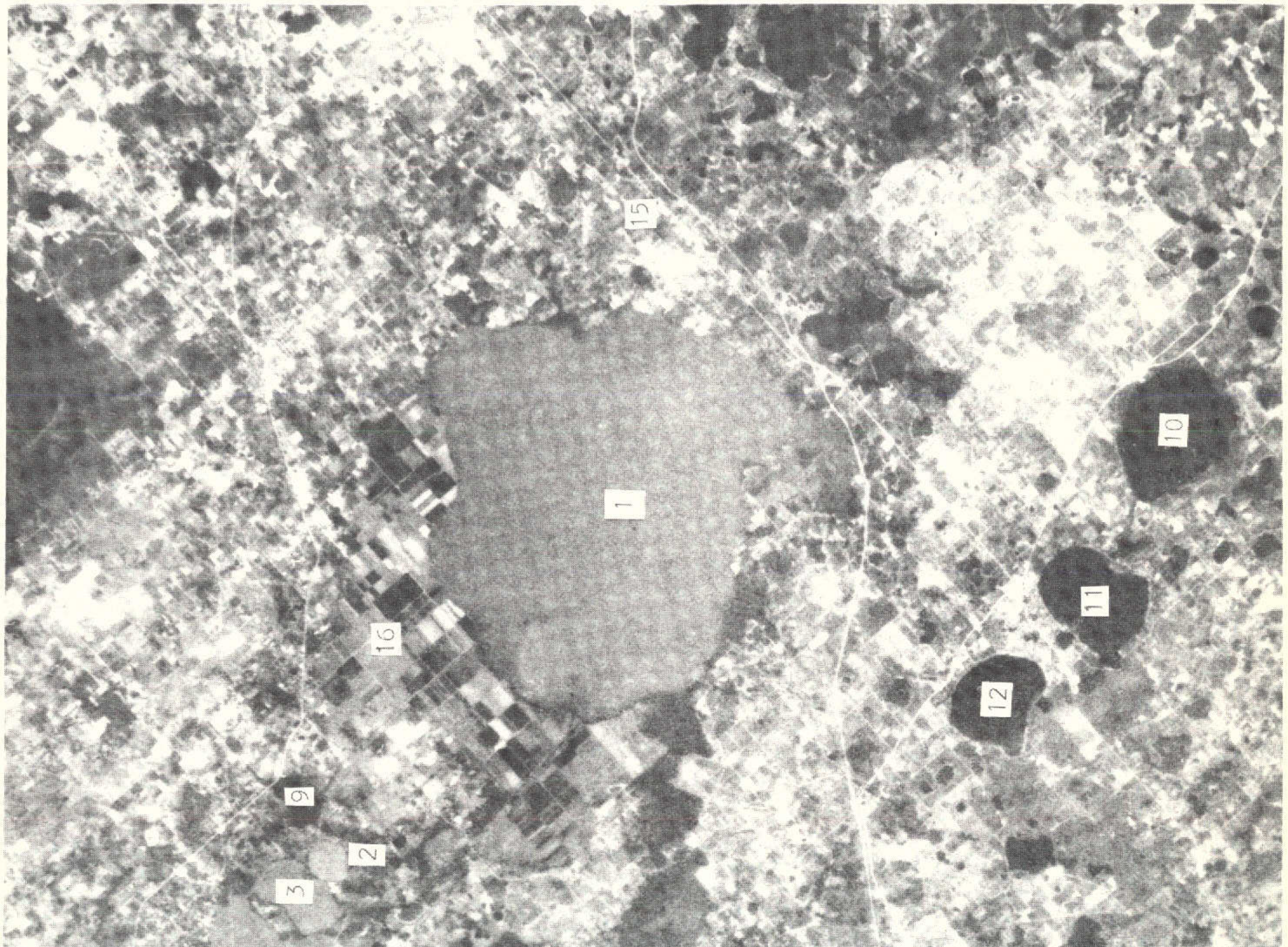

FIGURE 3

TABLE 2

1. Lake Apopka
2. Lake Carlton
3. Lake Beauclair
4. Lake Dora
5. Lake Eustis
6. Lake Griffin
7. Lake Harris
8. Lake Yale
9. Lake Ola
10. Lake Louisa
11. Lake Minnehaha
12. Lake Minneola
13. Silver Lake
14. City of Leesburg (population 12,000)
15. City of Winter Garden (population 5,000)
16. Muck Farms

TABLE 3

LAKE	RELATIVE DENITOMETER READING
Apopka	
Southern sector	0.35
Central sector	0.37
Northern sector	0.41
Dora	0.33
Eustis	0.32
Griffin	
South	0.25
↓	0.26
to	0.40
↓	0.50
North	0.53
	0.54
Yale	0.54
Louisa	0.65
Minnehaha	0.60
Minneola	0.55

eutrophication on a basis of three parameters: (1) chlorophyll a, (2) unfiltered turbidity-filtered turbidity, and (3) particulate organic nitrogen. All three of these parameters are algal-related for this lake system. One listing of some of these lakes[2] in descending order of eutrophic state is given by Table 4. The exact numbers probably are not significant, but it will be noted that the general order of state of eutrophication is consistent with the order shown by densitometer readings and given in Table 3.

As indicated previously[1], ERTS images show this effect. ERTS digital data (MSS Band 4) for April 28, 1973, have now been examined; and they show the effect clearly, including a pattern for Lake Griffin similar to the one in the EREP photograph. They also show a lake-to-lake pattern similar to that of Table 3.

The EREP MSS data do not include these lakes.

It seems sufficiently likely that the lake coloration shown by satellite photography, particularly in the 0.5-0.6 μm range, and by MSS data in the same wavelength range is algal-related to justify further investigation.

EREP data for this region were taken on two Skylab 4 passes, and water samples were taken by G & FWFC personnel from some of these lakes on both dates. Correlation will be sought between the photographic data and the sampling data.

TABLE 4

LAKE	EUTROPHIC RANK
Minneola	7
Ola	20
Minnehaha	30
Louisa	35
Beauclair	49
Harris	86
Carlton	91
Griffin	92
Apopka	102

ACKNOWLEDGEMENTS

Equipment located in the Analysis Facility of the Earth Resources Group at Kennedy Space Center has been used in this work.

Continuing discussions on application of these data to lake water quality problems are held with Brevard County Environmental Planner Brett Horsley and Florida Game and Fresh Water Fish Commission Agents Dennis Holcomb, Homer Royals, Vince Williams, David Cox and Dennis Auth.